AMRAD NEWSLETTER

Amateur Radio Research and Development Corporation February 1981

OUR FEBRUARY 2 MEETING will be a talk by Bob Watson on radioteletype demodulation techniques. Bob is an electronic engineer with Watkins-Johnson and works with state-of-the-art demodulation circuitry. The meeting will be held at the Patrick Henry Branch Library, 101 Maple Ave E, Vienna, VA at 7:30 p.m. Visitors and guests are invited.

RTTY modulation and demodulation are of special concern to us at this time as we consider how best to transmit packet radio as part of an amateur network. A number of hams have just assumed that changing from Baudot to ASCII means an automatic increase of speed from 45 to 110 baud, thus a net loss in readability. Well, there's a lot more to it than that, and Bob may try to convince us that there could be a net gain if we use the built-in structure of ASCII (e.g., parity) and use optimal demodulation techniques.

IF YOU MISS THE MARCH NEWSLETTER ISSUE or if it's delayed in getting to you, it may be because your editor is traveling to Italy on business. If an issue is missed, we'll extend everyone's subscription accordingly. The trip is planned, but the exact date is still up in the air. So that you will know what is planned for future AMRAD meetings, here are the plans:

The March 2 meeting will be a return engagement by Ken Coghill, WB4ZOH with even more spectacular computer music. It is always a full house at Ken's concerts so plan to get to the meeting early to assure yourself of a seat. Bring the music lovers in your family.

Our April 6 meeting will not be held at the Patrick Henry Branch Library in Vienna but will be the 1981 ARRL Technical Symposium run by AMRAD at the Washington Hilton Hotel. The 6th is the beginning of the IEEE Vehicular Technology Society Annual Convention. By the way, we're still looking for technical papers for the symposium. If you can give a paper please contact Paul Rinaldo W4RI, 703-356-8918, days or evenings.

A COPY OF THIS NEWSLETTER is being sent to a number of individual amateurs who responded to an item in Ted Cohen's column in *CQ Magazine* about the proposed amateur computer network AMNET. An outline of the AMNET concept and some of the AMRAD activities in that direction is given in this newsletter.

THE VIENNA WINTERFEST^{tm} is scheduled for February 22. AMRAD is planning to have two tables reserved for the club members' use. So, if you have just an armful of junk or less to peddle, bring it along to the AMRAD table. Perhaps you can spend an hour or so at the table when your feet give out.

THE SPREAD SPECTRUM SPECIAL INTEREST GROUP is now standing by to hear some word from the Federal Communications Commission on the AMRAD request for a Special Temporary Authority to do some experimenting. To date 29 stations throughout the U.S. have signed up to be participants. At this point, we are not looking for others to throw their hats in the ring. There may be opportunity for that after the STA is underway. The latest word from the FCC is that the request is working its way through the system and has been placed on the Interagency Radio Advisory Committee (IRAC) because any new amateur use of the 420-MHz band requires IRAC coordination. Our SSSig secretary, Hal Feinstein, WB3KDU is trying to keep the flow of information going by corresponding with individuals in the SSSig. We're also planning to set up a voice net at 4 p.m. EST on Sundays on 20 meters and simultaneously (QSP) on the AMRAD 2-meter repeater. The tentative 20-meter frequency is 14290 kHz.

THE ARRL PETITION OF DIGITAL TECHNIQUES that appeared in the AMRAD Newsletter two months ago has been assigned the designation RM-3788.

COMPUTING AND THE HANDICAPPED is the subject of several articles in IEEE Computer Society's *Computer* magazine for January 1981. Single copies are available from IEEE Service Center, 445 Hoes Ln, Piscataway, NJ 08854; $3 members, $6 non-members.

rules? The answer to this question is crucial because it determines what frequencies may be used in packet radio service. For example, it would be nice to use the non-satellite portion of 145.5 - 146.0, but "repeaters" are not permitted there. It would also be nice to be able to use digipeaters on HF.

A conservative opinion goes something like this: Of the various types of stations and services defined in the rules, "repeater" clearly is the best match, and thus digipeaters must be in the repeater subbands.

A moderate opinion: The FCC never envisioned digipeaters and the intent of the rules really is to control duplex machines. Use any frequency.

A radical opinion: A digipeater is a remotely controlled object, a store-and-forward message box. The use of the word "repeater" in "packet repeater" is an unfortunate accident and should not be confused with the meaning of "repeater" as in the rules.

Issue #2 - What frequencies?

We should establish national frequencies for packet radio service. This issue has been submitted to the local frequency coordination council and may work its way up the bureaucracy. Has AMRAD chosen any simplex frequencies, and if so, what are they?

Issue #3 - Coordination

In order to form cross-country packet radio nets, we need a coordinating committee to identify and keep track of local and regional activities. Active and interested individuals need to be able to get together, missing sites in repeater links need to be identified, protocol problems have to get resolved, etc. For a starter, one person in each time zone should be identified and given a suitable title.

So there you have the status of Pack

Best regards to all for 1981,

Hank Magnuski, KA6M

Our thanks to Hank for the above informative letter. Now that the channel is open we hope to work as closely as possible with Hank toward establishing a North American amateur computer network.

The following items concern experimental 30-meter operation by VE3QB and VE3BPD:

30-METER BAND OPERATION was begun last week by VE3QB, using his recently assigned Canadian commercial callsign, VE9LFZ, for preliminary one-way transmissions with partner VE9LIN (VE3BPD). They plan to operate daily at 1500, 1700, and 1900Z plus random times evenings starting at 2200Z. CW and (later) ASCII will be the modes, using 10.101 and 10.149 MHz.

VE9LFZ Was Solid Copy on 10.101 MHz in the Midwest Thanksgiving afternoon, with a more than hour-long transmission that peaked as high as 5-6 even though Larry was running only five watts to an inverted V. Note: These are test transmissions only, authorized by the Canadian government, and Amateur operations on this band will be illegal until January, 1982. *HR Report December 5, 1980.*

VE9LFZ and VE9LIN have been quite active on 30 meters, though they've had to reduce power to a watt or less to keep signals over the 300-mile path between them to levels appropriate for their experiments. Even with that low power, however, they've been good copy near Chicago on 10.149 MHz. *HR Report December 19, 1980.*

Here's a letter from VE3DPB:

November 24, 1980

Dear Paul,

Thanks for your letter. Yes, I missed the AMSAT annual meeting this year. I don't like missing them but sometimes it has to happen.

As you know I am very interested in methods of narrowing digital modulation receiving filters. In my mind the conventional CW filter in amateur receivers is way too wide for the baud rates we use but, of course, we are limited by the ringing problem.

Don (W3QVC) has done some interesting experiments, and we have given talks at the Dayton Hamvention (twice).

Larry VE3QB in Ottawa has become interested in Petit's system and suggested running some tests on the 10.1 MHz band. With this in mind we applied for permits and so far I have got mine with the call sign VE9LIN. Max. pwr. 8 watts and good for 1 year.

Anyway Paul, when we have something to report you can count on hearing from us. I think a lot of AMRAD and I only wish there were more such organizations.

73,
Bert, VE3DPB

And now a letter from VE3QB:

19801229

Dear Paul:

... this letter is to seek some information and to let you know what we are doing here in Ottawa.

First I have tried your bulletin board 703-281-2125 quite a number of times some months back. I always got an answer and data tones - but regardless of parity, speed, character sent I couldn't get it to

talk to me. Have you any further info on this? *(Yes. I don't know what the trouble was because lots of others have been successful accessing it. However, it is all moot now because we have moved our bulletin board to 703-734-1387. See the back page of the newsletter for info. Ed.)*

I am interested in your HEX program and would appreciate further details.

I've also been involved with our local bulletin board sponsored by the Ottawa Computer Group. I've written all the software and hope to have bubble mass storage by next summer. We have just finished a clock/calendar and I am now going to start a user selectable subsets of the stored information. The OCG have decided they will NOT support mechanical mass storage - i.e., floppies - so our two way messaging will have to wait until we get some bubbles, Hi.

For full computer conferencing we will link our bulletin board (613-236-3009 by the way - several CR's at 110 or 300 bps) to a large 370 type mainframe using our packet radio system. Our packet system is on 222.34 and runs at 9600 bps.

We are just getting ready to open up a gateway to HF from our local packet system. This has been much delayed but we will very shortly be on 14076 F1, 170 Hz. This is a fully automated system - no operator is even possible at this point. As well we are on 10.149 using QRP (commercial calls VE9LFZ (me) and Bert VE9LIN) developing computerized digital filters at low bit rates (10 bps & slower).

I have to run now but lets hear from you. I'll call in on your bulletin board if I get the info.

73,
Larry Kayser, VE3QB
24 Arundel Ave
Ottawa, Ontario
Canada K1K ØB6

AMNET

A NUMBER OF PEOPLE have written us in response to an item which appeared in Ted Cohen's column in *CQ* magazine. We have had some stimulating conversations with interested individuals over the past few months. As a result, the AMNET concept is continuing to evolve. We have developed a working philosophy along these lines. There *is* going to be an amateur computer network of some type springing to life sometime during the 1980's. The evidence is quite clear from the dynamic work undertaken by groups in Vancouver, Montreal, Ottawa, Chicago, San Francisco Bay area, and of course some meager efforts of our own. Also, there are roughly 200 computerized bulletin board systems (CBBS's) in the U.S. and Canada which represent a resource just crying to be tied together in a network. There have been years of discussions on how to pay for long distance calls between CBBS's - a sticking point. There has also been much debate about protocols. A number of the computer hobbyists interested in telephone linking of computers tend to dismiss amateur radio as a suitable way of moving personal computer traffic due to licensing requirements. The counter-argument is that there are enough licensed hams around North America to make a network work. Also, a sufficient number of the true prime movers in personal computing are already hams. So, it seems reasonable to use the Amateur Radio Service and Amateur Satellite Service frequencies where possible and supplement this with telephone calls. Cost of long-distance calls can be reduced by using higher speeds, calling after 11 p.m., and possibly using Value Added Networks or the so-called private phone companies that offer low long-distance rates between cities.

So, the basic idea is to have a number of nodes (computers) spread around North America, ham radio and/or telephone circuits to link them together, and an agreed protocol. Once you get much beyond that point, there may not be much agreement by the various advocates of amateur networking.

AMRAD has been in touch with many of the people in the U.S. and Canada who are trying to make serious contributions to amateur networking. Some concepts are taking shape but need much more discussion and coordination.

We have been talking to Telecommunications for the Deaf, Inc. (TDI) to see how some of the needs of the deaf could be met by a tie-in with an amateur network. (See Barry Strassler's column.) Hams are used to handling third party traffic. One advantage with the deaf is that they can originate and receive traffic in digital form, albeit in Baudot code. AMRAD's HEX system is a bulletin board with ability to speak either ASCII or Baudot. So, the code conversion problem can be solved by bilingual CBBS's such as HEX.

AMRAD has been working closely with the American Radio Relay League (ARRL) to get them to make a committment to amateur computer networking. The ARRL is a sizeable organization with resources that would be indispensable in this endeavor. These include the National Traffic System (NTS), *QST* and other publications to get the word out, and ability to raise needed funds. Finally, the League's good offices could be very valuable in resolving problems that arise.

We'd like to hear your views.

ASCII Modems... Computer Modems Packet Radio Modems...

--- Bell 202 Compatible, 1200 Bits Per Second ---
Rixon-Sangamo T202C & T202D & T202E

Recently the FCC opened the amateur bands to ASCII code transmission at speeds which far surpass the traditional RTTY rate of 45 Baud. For example, data transmission on 2 meters can now run at 1200 Baud, opening up new possibilities for computer-to-computer file exchange, packet radio, computer radio networks, automatic traffic handling between regions, and all sorts of new services which were unavailable previously.

To take advantage of this new service a station needs a computer (or at least a terminal), a modem and a radio. The modem converts the computer's digital signals to tones suitable for use on voice channels. There are many different modems currently in industrial use, but the Bell 202 type modem is quickly becoming the defacto standard for radio service at 1200 bps.

A Bell 202 modem is a frequency shift keying device which has a mark tone at 1200 Hz. and a space tone at 2200 Hz. These units generally operate in half-duplex mode (only one direction at a time) which is great for radio work, but a little inconvenient for telephone use. Some 202 units have a low speed reverse channel which allows full duplex signalling on a phone circuit. Since industry is currently adopting full-duplex 1200 bps modems, many 202 type units are appearing on the surplus market and can be purchased at very reasonable prices. There is no easier way to get your computer on the air.

In order to promote packet radio concepts and the greater use of ASCII on the air, Hank Magnuski, KA6M, purchased a large quantity of Rixon/Sangamo T202 modems which were being dumped by an industrial broker. Rixon/Sangamo is one of the leading and most reputable modem manufacturers in the country. These modems were built around 1970 from discrete components and are very rugged and serviceable. The manufactururer has been most cooperative in providing us with technical documentation on these modems, and we now have copies of the complete service manuals. The modems are being refurbished and checked out by Explorer Post 599, and various checks are made to insure that the units function. The prices are hard to beat:

T202D, 8 Card unit for 2-wire or 4-wire service, $75, T202D, 10 Card unit includes slow speed reverse channel, $85, T202C, 11 Card unit with reverse channel and auto answer, $90, T202E, 3 Card unit with transmit only capabilities, $50.

For more information contact: Chris Schellenberg, WB6WBK, (415) 324-4591, John Buonocore, KA6CUG, (415) 366-1658, Hank Magnuski, KA6M, (415) 854-1927.

Reprinted from the November/December edition of the *Homebrew Computer Club Newsletter*.

A NEW FACSIMILE TEST CHART has been published by the Institute of Electrical and Electronics Engineers as IEEE Standard 167A-1980. It is nearly identical in appearance to the 1975 edition except for some changes in type faces and better control of density ranges. Copies of the IEEE Facsimile Test Chart are available from the IEEE Service Center, 445 Hoes Ln, Piscataway, NJ 08854 for the price of $5 plus $2 shipping/handling.

REDUCING APPLE II RFI is the subject of an article, RFI: the F.C.C. and Your Apple which appears in the Fall 1980 edition of *Apple Orchard*, published by the International Apple Core, P.O. Box 976, Daly City, CA 95017. A parts kit is available from Apple Computer under part number 652-0152. It consists of two 0.1 μF capacitors, two solder lugs, and six ferrite beads.

ATV MAGAZINE NOW HAS a new address. Effective immediately all communications should go to ATV Magazine, 7391 West Highway 46, Ellettsville, IN 47429. Thanks *HR Report*.

A MODEM POCKET GUIDE has been announced by Hayes Microcomputer Products Inc. The book, which is to be available through local computer stores, gives basics of data communications and explains how to expand your personal computer capabilities by adding a Hayes modem.

IF YOUR NEWSLETTER COPY has been stamped, then it's time to renew your membership.

THE DEAF AND THE TTY

Barry Strassler
Executive Director
Telecommunications for the Deaf, Inc.
814 Thayer Avenue
Silver Spring, Maryland 20910
TTY 301-589-3006

DEAF COMPUTER COMMUNICATIONS ENTER THE PICTURE

The costly long distance telephone bills hit the deaf people hard. Sociologically, their roots are not wholly confined to the neighborhood or to the immediate locale. It is not uncommon for their friendships and family ties to exist from coast to coast. It is theoretically possible for deaf families to embark on a cross-country motor trip and not spend a cent on motel fees, instead, staying at homes of people they know.

What this means is that they, just like everyone else, like to use the telephone to call up their friends and families. Long distance rates can be very costly, expecially with the benchmark of 150 words per minute voice rate versus the average typing speed of some 25 words per minute. For slow typists, the rate is even less. Thus, the electronic mail network comes very prominently into the picture.

In 1978, the Deaf Community Center (DCC) of Framingham, MA, aided by a government grant, pioneered the electronic mail network for the deaf. This set-up served approximately 50 deaf households in the Boston area. This was called the HERMES, and responsible for its implementation was the firm of Bolt, Beranek and Newman. The terminals being used were TI Silentype 700. The HERMES project losts its Federal funding recently, so the host DCC group switched to the GTE Telemail network. It is too early at this point to assess the Telemail progress.

Then in 1979, the SRI International landed a contract (with the TDI as the subcontractor) to develop the DEAFNET project in the Washington, DC area. The San Francisco Bay area was also used to a smaller extent. For a time, a three-city hookup was effected. The DEAFNET is similar to the HERMES but with one very important exception. The DEAFNET is compatible with the ASCII and Baudot terminals while HERMES does not accommodate the latter terminals. This DEAFNET contract is now in its third and final year of implementation. Currently underway is the establishment of a consortium to prolong the life of DEAFNET over and beyond the December 31, 1981 expiration date.

The Washington DEAFNET has succeeded while the San Francisco DEAFNET has not. Why? Zone toll call rates exist in the Bay area while the Washingtonians are blessed with a large metro toll area serving some 50 miles wide. No one in California wanted to incur long distance costs just to log into DEAFNET only to find no new messages waiting for them!

Such other systems are in use that can be likened to offshoots of the above mentioned networks. These are Virginia TTY and HEX.

The TDI is committed towards computer communications and is working with AMRAD to develop ideas toward this end.

THE 1981 INTERNATIONAL TELEPHONE DIRECTORY OF THE DEAF is now available from TDI. The new "blue book" lists residential, commercial, governmental and organizational TTY phone numbers throughout the United States and elsewhere. Membership dues are $10 for the first year and $5 for renewals. Write TDI, 814 Thayer Ave, Silver Spring, MD 20910 for application blank. Radio and computer amateurs with deaf TTY capability should list their numbers in the directory.

THE FCC HAS ALLOCATED CHANNELS FOR PAGING devices for the deaf, blind and other handicapped persons under PR Docket 79-315. The full text of the Commission's decision has not yet been released (at this writing) but the essence is that the FCC has designated 35.02 and 43.64 MHz for this new service. These frequencies would permit the operation of tactile paging units for the hearing impaired or conventional digital paging for others. Thanks K3JW.

AMSAT
Radio Amateur Satellite Corporation
P.O. BOX 27, WASHINGTON, D.C. 20044

Here are some excerpts from a letter written by AMSAT president Tom Clark, W3IWI to AMSAT life members:

I'm writing to you as a key supporter and Life Member of AMSAT to review the happenings of 1980, to describe our current activities and needs, to transmit to you my warmest Holiday Greetings, and to give you my New Year's prophesy on the directions of the future.

On New Year's day, 1980 we were involved in an intensive period of construction, integration and testing that, two months later, would culminate in the completion of Phase-IIIA. By late February, AMSAT's new spacecraft was ready for shipment to the European Space Agency (ESA) facility in Toulouse, France for launch vehicle integration and acceptance testing. All continued to go well, the hardware was shipped to Marburg for a memory transplant and final tuning of the antennas, and thence shipped to French Guiana for the launch. And then the unthinkable. BLACK FRIDAY. May 23, 1980 Ariane launch vehicle fails. Phase-IIIA is lost.

The gloom and despair and depression lasted for about a day when an interesting metamorphosis occurred. The "hard-core" of the technical workers, including both Jan King and Karl Meinzer began saying, "Damn it. We worked too hard to quit now. Let's try again." Like Phoenix, we have emerged from the ashes with an organization that is stronger than ever.

As we enter 1981, we have secured a ride for Phase-IIIB. The launch date is scheduled for February 24, 1982 on Ariane flight L-7. Hardware is already under construction in Marburg, Budapest and Washington. We are engaged in negotiations for a Phase-IIIC launch, with a date circa 1983. Thus two sets of Phase-III hardware are being constructed in parallel.

The people situation - Do you share the enthusiasm? Do you have some untapped talent that you can offer?

The money situation - The most serious problem is financial. The accelerated Phase-IIIB construction schedule, the decision to build Phase-IIIC in parallel, the requirements of the other activities, and the high inflation rate have upped the ante for the first half of 1981. Assuming that these new campaigns pick up momentum by next summer, we will need $70-100,000 to bridge the gap. If each of the Life Members gave just $50, we could make it through this critical period, especially if your contributions are applied against the ARRL Foundation and Hoover matching grants. Of course, some won't heed my plea, so I hope that you will be able to give more -- remember that the total needs for the next two years are $250,000.

It is you who help forge the future of AMSAT. We await your response, your vote of confidence, so that we may continue to expand amateur radio's horizons in space.

73,

Tom Clark - W3IWI

P.S. Thanks to you and AMRAD for your help and support. Tom

AMSAT, P.O. Box 27, Washington, DC 20044

Yes, I want to be a member of the AMSAT Team and receive ORBIT Magazine.
Enclosed are my dues of $16 for 1981 ($200 for Life Membership).

☐ New Member ☐ Renewal ☐ Life Member ☐ Donation (tax deductible)

Name _____ Call _____

Address _____

City _____ State _____ Zip ____

THE GEORGE WASHINGTON UNIVERSITY Continuing Engineering Education Program announces the following short courses to be presented in Washington, DC:

738 Voice Input-Output: Communications with Machines, Mar 23-26
252 Electromagnetic Interference and Control, Mar 23-27
597 Digital Telephony, Apr 6-10
551 Frequency Management, Apr 20-24
465 Data Communications Systems and Networks, Apr 27-May 1
760 Telecommunications: Voice and Data, Apr 27-29

For further information contact the Continuing Engineering Education Program, GWU, Washington, DC 20052, 202-676-6106 or 800-424-9773.

THE MICROPERIPHERAL CORPORATION has just introduced a new line of direct-connect modems designed to interface most popular computers and terminals to the telephone network. All units feature Bell 103 compatible operation in the originate or answer mode

The TRS-80Connection^{tm} interfaces directly to the Model I and PMC-80 data/address bus. It can be connected directly to the keyboard to eliminate the need for the expansion interface or serial I/O RS-232 board.

The RS-232Connection^{tm} plugs into the standard DB25 connector.

The ATARIConnection^{tm} interfaces with the data I/O cable and connects in series with the 400 or 800 and cassette or disk drive.

The MICROCONNECTION^{tm} for the APPLE^{tm} employs a plug-in card to accomplish bus decoding and supplies an RS-232 compatible signal to the external MICROCONNECTION^{tm}.

Another option allows the MICROCONNECTION to be used with European systems (the EUROPEAN Connection). Tone frequencies are set to CCITT standards.

Prices start at $199.95. An AUTODIAL/AUTOANSWER option is available at $79.95, while the European option adds $29.95. The unit measures 7.75 in W x 5.75 D x 1.5 H and weighs less than a pound.

For additional information contact The MicroPeripheral Corporation, 4643 151st Place NE, Redmond, WA 98052, 206-881-7544.

TRS-80 is a trademark of Tandy Corp.
ATARI is a trademark of Atari, Inc.
APPLE is a trademark of Apple Computer.

TAB BOOKS, Blue Ridge Summit, PA 17214, 717-794-2191, announces publication of Radio Propagation Handbook (TAB Book No. 1146) by Peter N. Seveski, $17.95 hardbound-ISBN 0-8306-9949-X, $10.95 paperback-ISBN 0-8306-1146-0. Contents: Ground Wave Propagation, Ionospheric Waveguide Mode Propagation, High Frequency Ionospheric Propagation, Ionospheric Scatter Propagation, Microwave and VHF/UHF Propagation, Diffraction Propagation, Tropospheric Forward Scatter Propagation, Milimeter Wave Propagation. 504 pps.

RCA SOLID STATE, Box 3200, Somerville, NJ 08876 has announced price reductions on its CDP18S600 series of CMOS Microboard milliwatt computer systems as much as 47%. Write for details or call 201-685-6423.

HOWARD W. SAMS & CO, INC., 4300 West 62nd St, Indianapolis, IN 46268, 317-298-5400, has published 6502 Software Design by Leo J. Scanlon. In this book, the author gives you a working knowledge of the 6502 and the AIM computer. Scanlon is Documentation Manager for the Microelectronic Devices segment of Rockwell International. 272 pages. Softbound $10.50, ISBN 0-672-21656-6. Sams also has Design of VMOS Circuits, with Experiments by Robert T. Stone & Howard Berlin. 176 pps. Softbound $8.95, 0-672-21686-8.

AMRAD **Amateur Radio Research and Development Corporation**

Membership Application/Renewal

Mail to: Gerald Adkins, Treasurer
1206 Livingston St N
Arlington, VA 22205

See reverse for overseas mailing rates.

Dues:		Annual	Life
	Regular	$12	$120
	2nd in family	6	60
	Full-time student	3	-

Please make checks payable to AMRAD.

Name_____
Ham Call_____ Home Phone( )_____

Address_____
City,
State_____ ZIP_____

Class License_____ ☐ ARRL Member
Have: ☐ 2-meter FM ☐ RTTY
☐ Computer model_____
Microprocessor type_____

I agree to support the purposes of the Corporation.

*Signature*_____

THE AMATEUR RADIO RESEARCH AND DEVELOPMENT CORPORATION is a technically oriented club of about 300 radio and computer amateurs. It is incorporated in the Commonwealth of Virginia and is recognized by the Internal Revenue Service as a tax-exempt scientific and educational organization.

THE PURPOSES OF THE CLUB are to: develop skills and knowledge in radio and electronic technology; advocate design of experimental equipment and techniques; promote basic and applied research; organize forums and technical symposiums; collect and disseminate technical information; and, provide experimental repeaters.

MEETINGS ARE ON 1st MONDAY of each month at 7:30 p.m. at the Patrick Henry Branch Library, 101 Maple Ave E, Vienna, VA. If the 1st Monday is a holiday, an alternate date will be announced in the *AMRAD Newsletter*. Except for the annual meeting in December, meetings are normally reserved for technical talks - not business.

THE WD4IWG/R REPEATER is an open repeater for data communications (including RTTY), voice and experimental modes. It is located at Tyson's Corner, McLean, VA and has excellent coverage. It features a semi-private autopatch available to licensed members. Frequencies are: 147.81 MHz input, 147.21 MHz output. The head of the technical committee is Jeff Brennan, WB4WLW, 7817 Bristow Dr, Annandale, VA 22003, phone 703-354-8541.

THE AMRAD NEWSLETTER is mailed monthly to all members and to other clubs on an exchange basis. Technical articles, new product announcements, news items, calls for papers and other copy related to amateur radio and computing are welcome. Honorariums at a rate of $10 per printed page ($20 maximum per author per issue) are paid for original material accepted. Classified ads are free to members. Commercial ad inquiries are invited. The editor reserves the right to reject or edit any portions of the copy. Items should be mailed by the 8th of the preceeding month to Paul L. Rinaldo, W4RI, Editor, 1524 Springvale Ave, McLean, VA 22101; phone 703-356-8918. Full permission for reprinting or quoting items appearing in the *AMRAD Newsletter* is granted provided that credit is given. Mailing is by 3rd Class bulk mail to U.S. addresses and 1st Class to Canada and Mexico. Overseas readers add 96¢ for surface or $7.80 for air mail to annual dues.

THE AMRAD MESSAGE SYSTEM is an S-100 Computerized Bulletin Board System on 703-734-1387, system operator Terry Fox, WB4JFI. Terry's home phone number is 703-356-8334. The system accepts 110, 300, 450 and 600 baud ASCII callers using Bell 103-compatible modems.

THE HANDICAPPED EDUCATION EXCHANGE (HEX) is operated by AMRAD for those involved in education and communications for the handicapped. It accepts both 110/300-baud ASCII and deaf TTY callers. on 301-593-7033. The sysop Dick Barth, W3HWN's home phone is 301-681-7372.

AMRAD OFFICERS for 1981 are:

Gerald Adkins, N4GA	Treasurer
Jeffrey Brennan, WB4WLW	Director
	Repeater Trustee
Tedd Riggs, KA4FYU	Librarian
Robert E. Bruninga, WB4APR	Director
	VP-Asia
Kenneth Coghill, WB4ZOH	1st Alt.
Terry Fox, WB4JFI	Director
	Vice Pres.
	Computer Trustee
William Pala, Jr., WB4NFB	Director
	Secretary
Paul L. Rinaldo, W4RI	Director
	President
Elton A. Sanders, Jr., WB5MMB	2nd Alt.

THE AMRAD LIBRARY is operated by Tedd Riggs, KA4FYU, 8402 Berea Ct, Vienna, VA 22180, phone 703-573-5067. Donations of technical books, magazines, manuals and catalogs are tax-deductible.

AMRAD IS AFFILIATED with the American Radio Relay League (ARRL), the Foundation for Amateur Radio, the Northern Virginia Radio Council (NOVARC) and The Mid Atlantic Repeater Council (T-MARC).

SPECIAL INTEREST GROUPS are formed from time to time. Currently we have SIG's on Deaf Communications and Spread Spectrum Communications. If you are interested in joining or forming a SIG, please contact Bill Pala, WB4NFB, 5829 Parakeet Dr, Burke, VA 22015; phone 703-323-8345.

TRAINING CLASSES are run as needed. Please discuss your training requirements with any Director.

AMATEUR RADIO RESEARCH AND
DEVELOPMENT CORPORATION
1524 SPRINGVALE AVENUE
MCLEAN, VA USA 22101

Nonprofit Organization
U.S. Postage
PAID
McLean, Virginia 22101
Permit No. 1511

HOWARD L NURSE W6LLO
665 MAYBELL AV
PALO ALTO CA 94306